

## NOTES ON *MACROZAMIA* MIQ. (ZAMIACEAE) IN QUEENSLAND WITH THE DESCRIPTION OF TWO NEW SPECIES IN SECTION *PARAZAMIA* (MIQ.) MIQ.

David L. Jones

Australian National Botanic Gardens, GPO Box 1777, Canberra, ACT 2601,  
Australia

### Summary

*Macrozamia fearnsidei* and *M. lomandroides*, both members of section *Parazamia* (Miq.) Miq. from central Queensland, are described as new, the new combination *M. plurinervia* is made for *M. pauli-guilielmi* subsp. *plurinervia* L. Johnson and *M. mountperriensis* Bailey is recognised as specifically distinct from *M. miquelii* (F. Muell.) A. DC. A key to the species of *Macrozamia* in Queensland is given.

### Introduction

The most recent systematic treatment of *Macrozamia* Miq. is that of Johnson (1959) who recognised 14 species and gave a key to identify them. This work provided the basis for flora treatments (Johnson 1961; Stanley & Ross 1989) and was a valuable foundation for biological and genetic studies (Ornduff 1986, 1990; Ellstrand, Ornduff & Clegg 1990). Taxonomic problems have been identified in the genus and some of these have been investigated by me over the last three years. This paper presents the results of studies into taxa in Queensland. A key is presented to the Queensland species of *Macrozamia*.

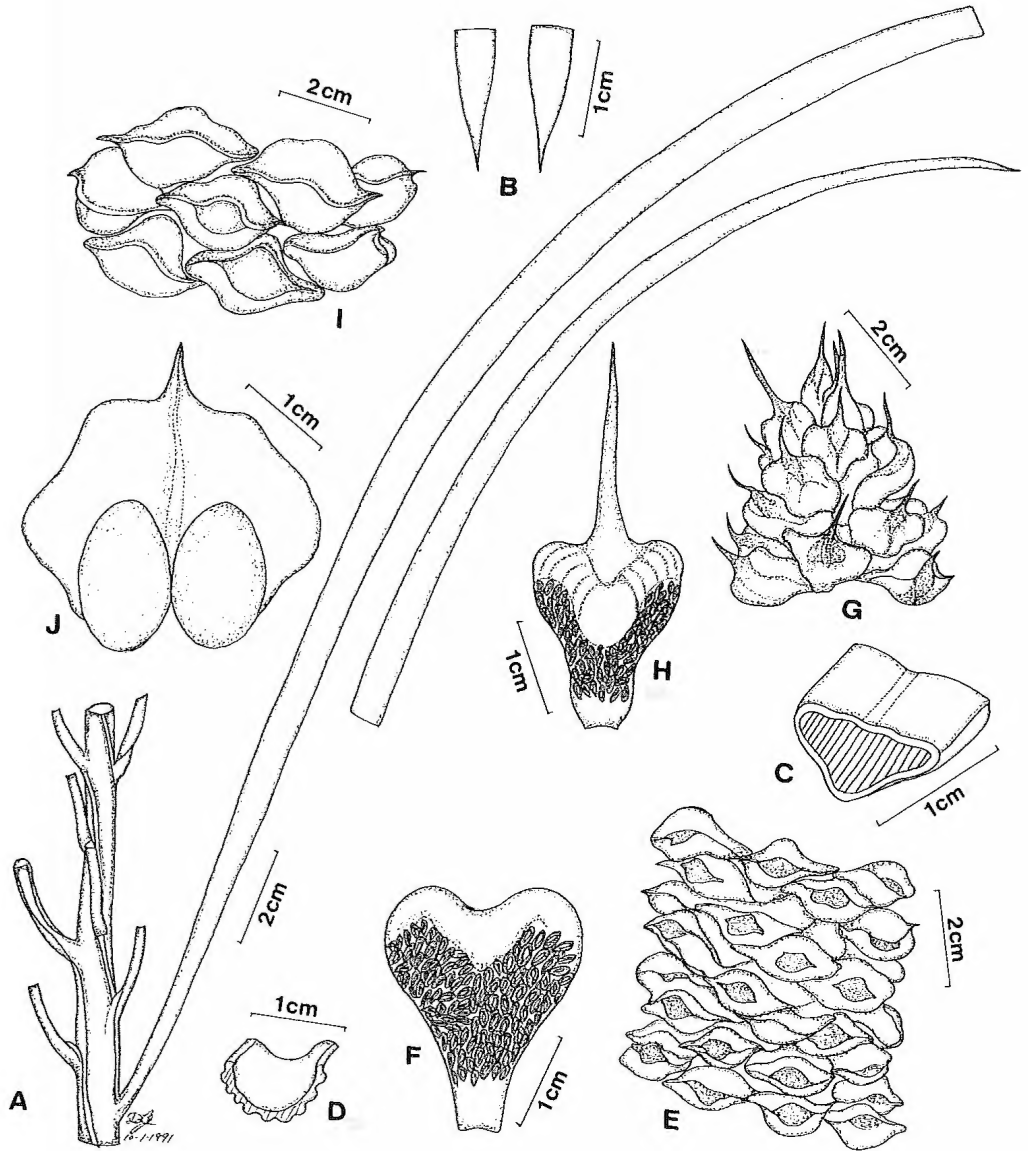
### Taxonomy

***Macrozamia fearnsidei* D. Jones sp. nov.** affinis *M. pauli-guilielmi* W. Hill et F. Muell. habitu multo robustiore pluribus frondibus (usque 20) coronata, pinnis concavis multo longioribus latioribus nitentibus viridibus supra, strobilis magnis eorum sporophyllis plurimis spina apicali vestigiali praeditis differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Wallaroo Station, c. 64 km north of Injune, 26 August 1990, *D.L. Jones* 6307 & *B.E. Jones* (holo: CBG; iso: BRI,CBG,NSW).

Caudex more or less ovoid, 15–35 cm diameter, subterranean. Fronds 70–140 cm long on mature plants, dark green and lustrous, 5–20 in an erect very bushy crown, rarely nearly prostrate; petiole (excluding the woolly expanded base) 15–40 cm long, c. 15 mm across at the top of the expanded base, dark green, dull, flat or slightly concave above, strongly convex below; rhachis spirally twisted 1–5 times, 8–10 mm across at the lowest pinnae, the cross-section similar to that of the petiole, dull green, with irregular cream markings between the bases of the distal pinnae but not in a continuous band. Pinnae linear, arising at a steep angle to the rhachis, obliquely erect to arcuate before drooping in the distal third, 20–60 cm × 6–11 mm, hypostomatic, dark green and shiny above, paler with 9–12 prominent raised veins beneath, strongly concave in cross-section, spirally twisted 1–4 times, apex acuminate, slightly pungent, callous base cream to pale yellow, 55–120 per frond, arranged more or less in two ranks but not always in opposite pairs, crowded, the longest pinnae found towards the middle of the frond, lower pinnae hardly reduced. Male cones more or less cylindrical, 15–27 cm × 4.5–6.5 cm, usually curved with age; peduncle 18–30 cm × 1.2–1.8 cm, circular to elliptical in cross-section; sporophylls cuneate to cordate, 1.6–2.2 cm × 1.5–2 cm, those in the proximal two-thirds of the cone with vestigial spines, distal ones with stiff, pointed spines to 1.3 cm long. Female cones more or less ovoid, 12–18 cm × 8–10 cm, erect; peduncle 18–27 cm × 1.5–2.2 cm, elliptical in cross-section, furrowed; sporophylls with stipe 1–1.5 cm long, transversely ovate to reniform, 1.7–2.8 cm × 1–1.5 cm, with a prominent depression just below the apical spine, spines increasing in length towards the apex of the cone, the longest c. 2 cm long. Seeds 2.3–2.7 cm × 1.9–2.3 cm, the sarcotesta orange to scarlet when ripe. **Fig. 1.**

**Specimens examined:** No specimens of this species occur in the collection at BRI.

**Distribution and habitat:** Locally common on escarpments of the Expedition Range to the north of Injune and probably also in adjacent ranges. It grows in sandy soil in tall



**Fig. 1.** *Macrozamia fearnsidei*: A. portion of rhachis and one pinna. B. tips of pinnae. C. TS of rhachis. D. TS of pinna. E. basal portion of male cone. F. male sporophyll (from below) from basal portion of cone. G. apical portion of male cone. H. male sporophyll (from below) from apical portion of cone. I. portion of female cone. J. female sporophyll. From Jones 6307.

open eucalypt forest either in gullies near ephemeral streams or on rocky slopes, sometimes in association with *Macrozamia moorei* F. Muell.

**Phenology:** Cones mature September – October; seeds ripen February – April.

**Notes:** *M. fearnsidei* is a distinctive component of the complex which surrounds *M. pauli-guilielmi*. It has the most robust plants of the group which have up to 20 fronds in the crown (*M. pauli-guilielmi* usually has only 2–5). The pinnae, which are much longer and broader than those in *M. pauli-guilielmi*, are strongly concave in cross-section and dark green and shiny on the upper surface (those in *M. pauli-guilielmi* are shallowly concave and dull). Male and female cones of *M. fearnsidei* are much larger than those of *M. pauli-guilielmi* and the majority of their sporophylls, especially those on the male cones, have only a vestigial apical spine (this spine is well developed on most sporophylls of *M. pauli-guilielmi*). *M. plurinervis* also has affinities with *M. fearnsidei* but its leaflets are shorter, duller and much more leathery. *M. platyrachis* F.M. Bailey is the closest member of section *Parazamia* geographically to *M. fearnsidei* but is not closely related and can be readily distinguished by its nearly prostrate fronds which have hardly any twist in the rhachis. In common with most other species in the genus, the leaves of *M. fearnsidei*, especially those of the new growth after fire, are highly toxic to cattle (G. Fearnside, pers. comm.).

**Conservation status:** Locally common although not known to be protected by any security of tenure.

**Etymology:** Named in honour of Geoff Fearnside, owner of Wallaroo Station, in recognition of his successful combination of cattle farming with conservation practices on the property.

**Macrozamia lomandroides** D. Jones sp. nov. affinis *M. fawcettii* C. Moore pinnis rigide erectis confertis numerosioribus textura crassiore, rhachidi distincte complanata vel vadose concava supra differt. **Typus:** Queensland, WIDE BAY DISTRICT: c. 26.5 km south of Bundaberg beside the road to Goodwood, 29 September 1990, D.L. Jones 6341 & B.E. Jones (holo: CBG; iso: CBG,BRI,NSW).

Caudex more or less ovoid, 10–17 cm diameter, subterranean. Fronds 30–80 cm long on mature plants, dull green 2–6 in an erect or spreading crown; petiole 6–14 cm long, c. 8–10 mm across above the woolly, expanded base, pale green, dull, flat or shallowly concave above, strongly rounded beneath, two raised marginal ridges fairly prominent; rhachis spirally twisted 1–8 times, 10–14 mm across at the lowest pinnae, the cross-section similar to that of the petiole, with a pale green to cream marginal band especially noticeable in the distal two-thirds. Pinnae linear to slightly obovate, 20–30 cm × 0.9–1.4 cm, hypostomatic, straight or falcate, coriaceous, dark green and dull above, paler with 10–16 raised veins beneath, shallowly concave in cross-section, tapered to a relatively long, narrow base, callous base pale green to cream, apex with 1–6 sharp teeth on the acroscopic side, 1 or 2 on the basiscopic side, asymmetrical (often curved), 50–90 per frond, arising at a steep angle to the rhachis, then stiffly erect to obliquely spreading, arranged more or less in two ranks but not always in opposite pairs, crowded, the longest pinnae towards the base of the frond. Male cones more or less cylindrical, 12–15 cm × 4–5 cm, usually curved with age; peduncle 8–15 cm × 1–1.2 cm, elliptical in cross-section; sporophylls transversely ovate, 1.2–1.8 cm × 1.8–2.2 cm, those in the proximal two-thirds of the cone with vestigial spines, distal ones with stiff, pointed spines to 0.8 cm long. Female cones more or less ovoid, 12–18 cm × 7–9 cm, erect; peduncle 10–15 cm × 1–1.2 cm, elliptical in cross-section, hairy at the base; sporophylls with stipe 0.7–1 cm long, transversely ovate, 1.4–1.8 cm × 2.5–3.5 cm, with a prominent depression just below the apical spine, spines increasing in length towards the apex of the cone, the longest c. 3 cm long. Seeds 2.2–2.6 cm × 1.8–2.2 cm, the sarcotesta orange to red when ripe.

**Specimens examined:** No specimens of this species occur in the collection at BRI.

**Distribution and habitat:** Reported by cycad growers to occur in several sites south of Bundaberg between the Elliot River and the Isis River. It grows among grass in grey silty loam under tall open forest. Topography is usually flat but one site is on a slope with the plants growing amongst rocks.

**Phenology:** Cones mature October and November; seeds ripen March and April.

**Notes:** *M. lomandroides* is a distinctive species which probably has as its closest congener *M. fawcettii* from New South Wales. It can be distinguished from that species by the thicker-textured, stiffly erect pinnae which impart a distinctive crowded appearance to the fronds. Those of *M. fawcettii* are thinner and spread widely from the rhachis in a whorled appearance. The flat or shallowly channelled abaxial surface on the petiole and rhachis of *M. lomandroides* is also distinctive because in *M. fawcettii* this organ is completely round in cross section. The two species are separated geographically by a distance of about 400 km. *M. lomandroides* can be immediately distinguished from all other *Macrozamia* species in Queensland by the many, small, sharp teeth on the apex of the pinnae of mature fronds, these being particularly prominent on the acroscopic margin. Clumps of this species bear a strong resemblance to large plants of some species of *Lomandra*.

**Conservation status:** Not conserved and although locally common in small areas it is threatened by land clearing, with much of its habitat already converted to sugar cane production; suggest 2E according to Briggs and Leigh (1988).

**Etymology:** Resembling the genus *Lomandra*.

#### New Combination

*Macrozamia pauli-guilelmi* is a complex of taxa which was treated by Johnson (1959) as consisting of three subspecies. My field studies, which include visits to the vicinity of the type localities of all taxa, show that each of these is isolated and habitat specific and has unique characters. I am unable to locate any of the intermediates mentioned by Johnson and find that most members of this group grow in isolated colonies, especially those which occur in inland regions. In addition to *M. pauli-guilelmi* for the type subspecies, *M. flexuosa* C. Moore is available at specific rank for *M. pauli-guilelmi* subsp. *flexuosa* and *M. pauli-guilelmi* subsp. *plurinervia* is here raised to specific rank for the third taxon.

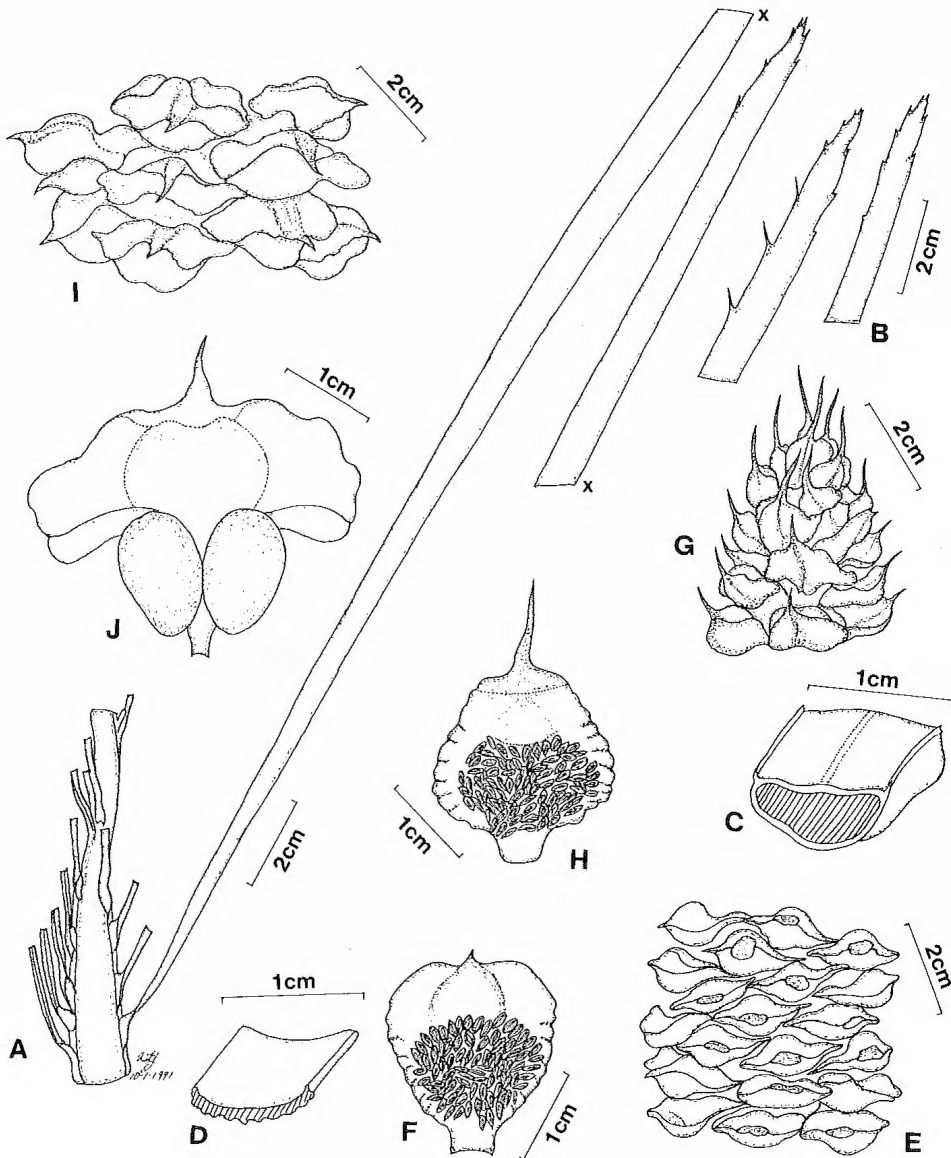
*Macrozamia plurinervia* (L. Johnson) D. Jones **comb. et. stat. nov.** *M. pauli-guilelmi* subsp. *plurinervia* L. Johnson, Proc. Linn. Soc. New South Wales 84: 108 (1959).  
**Typus:** Reedy Creek Station, near Bonshaw, New South Wales, April 1956, J. Leader (NSW 40958) (holo: NSW).

**Distribution and habitat:** Lower slopes and western parts of the Northern Tablelands, Central-western Slopes (upper Hunter Valley) and North-western Slopes of New South Wales and southern parts of the Darling Downs District of Queensland. This species grows in small colonies on ridges, protected slopes and gullies in sparse or stunted woodland, often with *Callitris* spp.

**Notes:** *M. plurinervia* can be distinguished from both *M. pauli-guilelmi* and *M. flexuosa* by its broader, stiffer, thicker-textured, dark green to nearly glaucous pinnae with the apex tapering fairly suddenly to the mucro and by its glaucous cones. It is a species of drier, inland habitats whereas *M. pauli-guilelmi* is strictly coastal and *M. flexuosa* extends from coastal cliffs to adjacent near-coastal ranges and valleys.

#### *Macrozamia mountperriensis* Bailey

*Macrozamia mountperriensis* was reduced to synonymy by Johnson (1959) who regarded the taxon as being a smaller form of *M. miquelii* (F. Muell.) A. DC., from drier, more inland country. It is however a stable taxon which is locally abundant in the Mount Perry region, exhibits remarkably little variation in the wild and retains its distinguishing characteristics in cultivation. For these reasons it is here recognised at specific rank. It can be distinguished from *M. miquelii* by its smaller fronds with proportionately longer petioles, the absence of reduced, spine-like proximal pinnae, much smaller cones and smaller seeds. It grows in large colonies on protected slopes and ridges in gravelly loam under sparse, tall eucalypt forest.



**Fig. 2** *Macrozamia lomandroides*: A. portion of rhachis and one pinna. B. tips of pinnae. C. TS of rhachis. D. TS of pinna. E. basal portion of male cone. F. male sporophyll (from below) from basal portion of cone. G. apical portion of male cone. H. male sporophyll (from below) from apical portion of cone. I. portion of female cone. J. female sporophyll. From Jones 6341.

**Key to the Queensland species of *Macrozamia***

1. Rhachis with a gentle spiral twist less than 180° . . . . . 2  
   Rhachis with at least one spiral twist of 360° usually several such twists  
     per frond . . . . . 6
2. Fronds held more or less horizontal, rhachis recurved near the  
    base . . . . . *M. platyrachis* Bailey 3  
   Fronds erect to obliquely erect, rhachis straight or gently curved . . . . . 3
3. Proximal pinnae reduced and spine-like . . . . . 4  
   Proximal pinnae slightly shorter than median pinnae but not reduced to  
     spines . . . . . 5
4. Reduced pinnae extending nearly to the base of the frond, pinnae dull  
    and thick-textured . . . . . *M. moorei* F. Muell.  
   Reduced pinnae stopping well short of the frond base, pinnae shining and  
     thin-textured . . . . . *M. miquelii* (F. Muell.) A. DC.
5. Pinnae mostly more than 0.7 cm wide, widely spreading to recurved  
    . . . . . *M. lucida* L. Johnson  
   Pinnae mostly less than 0.5 cm wide, directed forwards at an acute  
     angle . . . . . *M. mountperriensis* Bailey
6. Pinnae held stiffly erect, with 3 or more spine-like, apical teeth  
    . . . . . *M. lomandroides* D. Jones  
   Pinnae held obliquely erect to widely spreading, with a single apiculus . . . . . 7
7. Pinnae 0.2–0.5 cm across . . . . . *M. pauli-guilielmi* W. Hill & F. Muell.  
   Pinnae 0.8 cm across or more . . . . . 8
8. Rhachis hardly twisted, fronds recurved and more or less horizontal,  
    pinnae broadly linear, held obliquely erect . . . . . *M. platyrachis* Bailey  
   Rhachis strongly twisted, fronds erect, to obliquely erect pinnae linear,  
     spreading . . . . . 9
9. Pinnae to 25 cm long, dull, thick-textured, cones glaucous  
    . . . . . *M. plurinervia* (L. Johnson) D. Jones  
   Pinnae to 60 cm long, shiny, thin-textured, cones green . . . . . *M. fearnsidei* D. Jones

**Acknowledgements**

I am grateful to Geoff Fearnside for allowing me to study the cycads at Wallaroo Station and to Ross and Robyn Peatling for assistance and hospitality while there. I thank Stan Walkley, Paul Kennedy and Craig Thompson for enthusiastic support of my studies and assistance with specimens, Sandra Jones and Mark Clements for reading the manuscript, Les Pedley for supplying the Latin diagnoses and Barbara Jones for word processing.

**References**

- BRIGGS J.D. & LEIGH, J.H. (1988). Rare and Threatened Australian Plants. 1988 Revised Edition. Australian National Parks and Wildlife Service, Special Publication No. 14. Canberra: Australian National Parks and Wildlife Service.
- ELLSTRAND, N. C. ORNDUFF, R., & CLEGG, J. M. (1990). Genetic Structure of the Australian Cycad, *Macrozamia communis* (Zamiaceae). *American Journal of Botany* 77(5): 677–81.
- JOHNSON, L.A.S. (1959). The Families of Cycads and the Zamiaceae of Australia. *Proceedings of the Linnean Society of New South Wales* 68: 64–117.
- JOHNSON, L.A.S. (1961). Zamiaceae. *Contributions from the New South Wales Herbarium, Flora Series* 1: 21–41.

- ORNDUFF R. (1986). Male-biased sex ratios in the cycad *Macrozamia riedlei* (Zamiaceae). *Bulletin of the Torrey Botanical Club* 112: 393-7.
- ORNDUFF R. (1990). Geographic Variation in Reproductive Behaviour and Size Structure of the Australian Cycad *Macrozamia communis* (Zamiaceae). *American Journal of Botany* 77: 92-9.
- STANLEY, T. D. & ROSS, E.M. (1989). Cycadaceae and Zamiaceae. In *Flora of South-eastern Queensland* 3: 448-53.

Accepted for publication 12 April 1991